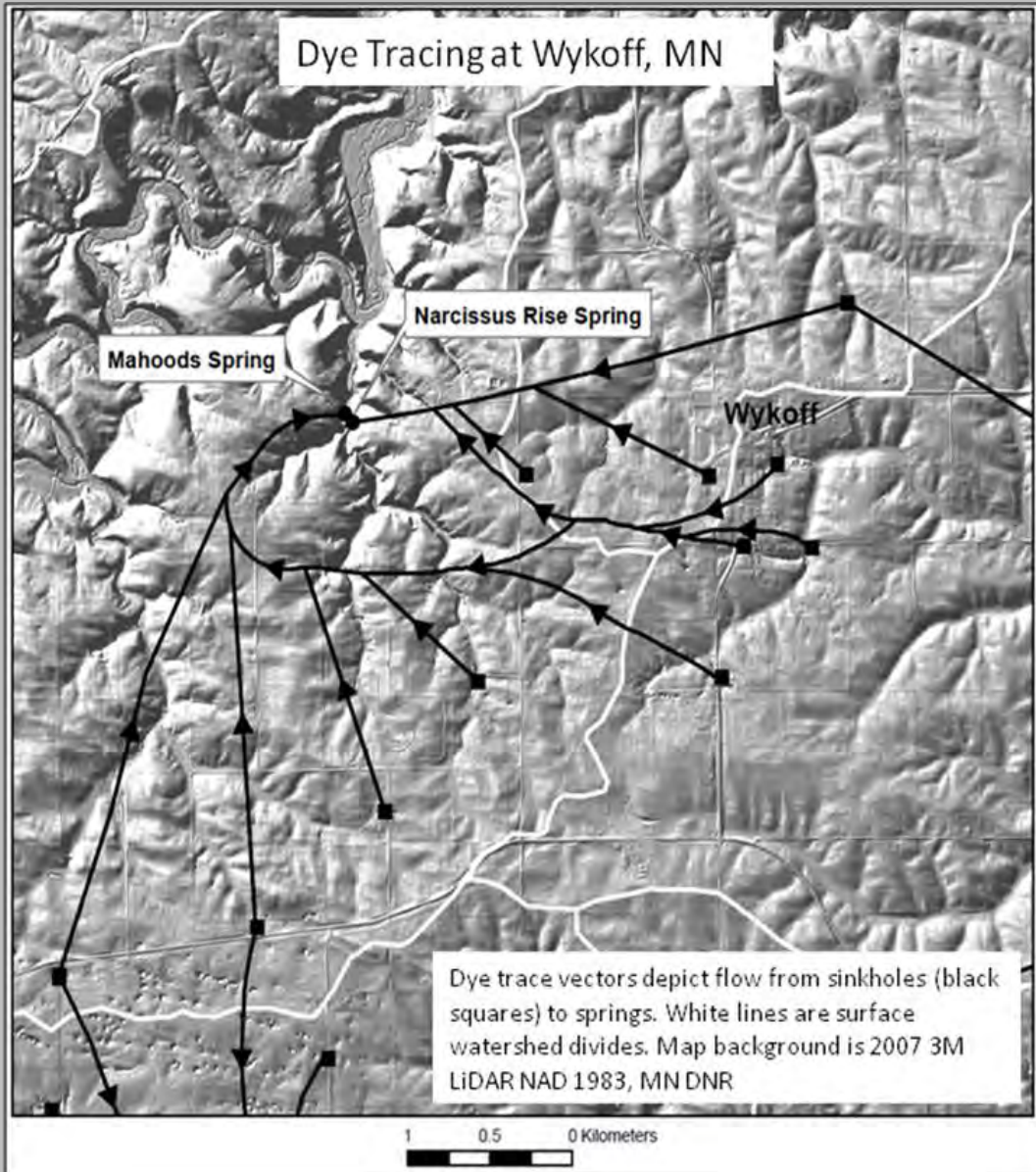


Karst & Stormwater Management- Examples from Minnesota

Jeff Green, P.G., MN DNR



The City of Wykoff (pop. approx. 800) is located in western Fillmore County. It is in an area underlain by Stewartville and Dubuque Formations, with less than fifty feet of overlying unconsolidated material. Sinkholes are very common in the area. Historically, the city used sinkholes as its stormwater receptors. Four sinkholes (one of which was covered up and was only found during a road and storm sewer upgrade) had been modified to receive stormwater. Both street surface runoff and storm sewer flow was routed into these sinkholes. The buried sinkhole was in the center of the city; the other three were at its west, east, and south boundaries.

Dye tracing from sinkholes on the west and south boundaries demonstrated that the city stormwater was moving through the Galena limestone to trout stream springs at a speed of 1-2 miles/day.

Stormwater was diverted from the buried sinkhole and the sinkhole on the south side of the city. The east sinkhole was sealed so now the stormwater discharges into a grassy swale.

For the west side sinkhole the engineering firm, WHKS, was able to re-route the stormwater away from this sinkhole into a swale that flows out of town. Since the sinkhole still received overland flow, some treatment was necessary. The sinkhole was excavated down to the opening in the bedrock. A perforated inlet pipe wrapped with filter cloth was positioned over the bedrock opening with large diameter rock placed around it. The excavation was then backfilled with smaller diameter rock and pea gravel. The pipe was in place to allow water that flowed to the sinkhole to be routed into the bedrock opening after it passed through the rock filter and filter cloth. This project cost \$20000.



West sinkhole excavation



Vertical pipe being set
into sinkhole swallet



Inlet pipe with filter cloth



Stormwater ponds & sinkholes- sinkhole at Dancing Waters,
Woodbury, MN



Big Spring at baseflow



Big Spring after runoff event

Some issues associated with karst stormwater management

- Rapid infiltration into groundwater system with little or no treatment
- Pathogens can enter groundwater system
- Rapid groundwater flow rates can transmit contaminants to water supply wells
- Karst groundwater flow paths often do not follow surface watershed topography
- Risk of sinkhole collapse in stormwater ponds